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7.6-10.481

CTR-148788

## FOURTH QUARTERLY PROGRESS REPORT

NASA Investigation #22640

November 21, 1975 - February 21, 1976

and

SUPPLEMENT FOR

February 21, 1976 - May 21, 1976

Kentucky Dept. of Natural  
Resources and Environmental  
Protection, Frankfort  
P.O. Box 1000, Frankfort, KY 40601

N76-33590

### A. PROBLEMS

The major problem encountered in the fourth quarterly period was that LANDSAT imagery acquired by a satellite overpass on October 30, 1975 was not received within this period. While part of the delay was occasioned by the fact that photo-products on standing order from EROS were not received from Sioux Falls until the end of December, some additional delay resulted from misdirected efforts of the Principal Investigator and one of the consultants who tried to expedite receipt of the CCT from EROS. The problem was resolved only by the very effective aid of our Technical Monitor at Goddard Space Flight Center.

The U-2 flight summary for the October 20, 1975 flight, necessary for ordering high altitude photography was not received until January 23, 1976.

### B. ACCOMPLISHMENTS

#### (1) December, 1975

All of the ground truth photographs from the October 30 exercise were received and forwarded to Ford, Bacon and Davis, Inc., for correlation with field notes.

Low altitude aerial photography, acquired in the test area on November 10, was processed. Black and white prints were supplied to Ford, Bacon and Davis, Inc., and color infrared transparencies were sent to ERIM.

#### (2) January, 1976

Ford, Bacon, and Davis, Inc., completed the final compilation of the ground truth and training set identification on the black and white aerial photographs. These were forwarded to ERIM on January 21, 1976.

(E76-10481) [ENVIRONMENTAL EFFECTS OF STRIP  
MINING] Quarterly Progress Report, 21 Nov.  
1975 - 21 Feb. 1976 (Kentucky Dept. of  
Natural Resources and) 5 p HC \$3.50

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**FOURTH QUARTERLY PROGRESS REPORT**  
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MATHEMATICA, has reviewed and begun refining the cost effectiveness models in light of interim observations based on the February 20, 1975 LANDSAT imagery.

**(3) February, 1976**

Computer compatible tapes of the October 30, 1975 LANDSAT imagery were not received within the report period. Consequently, work on the project was suspended by all of the principals except for MATHEMATICA's continued work on model refinement and testing.

Due to the assistance of the Technical Monitor at NASA-Goddard Space Flight Center, the order for the necessary computer compatible tapes was expedited to speed delivery of the tapes from Goddard Space Flight Center to EROS.

Primarily because of the cumulative effect of many delays in receiving imagery throughout the project, it was necessary to request an extension of the project for an additional three months beyond the scheduled completion date, February 21, 1976. A three month extension in time at no additional cost was granted.

**C. SIGNIFICANT RESULTS**

None to report.

**D. PUBLICATIONS**

None to report.

**E. RECOMMENDATIONS**

None

**F. FUNDS EXPENDED TO FEBURARY 21, 1976**

\$2,731.00

FOURTH QUARTERLY PROGRESS REPORT  
Page Three

G. DATA USE TO FEBRUARY 21, 1976

	<u>VALUE OF DATA ALLOWED</u>	<u>VALUE OF DATA ORDERED</u>	<u>VALUE OF DATE RECEIVED</u>
LANDSAT Imagery	700	427	427
Computer Compatible Tapes	1000	400	200
Aircraft Imagery	2538	1904	1904

H. AIRCRAFT DATA

High altitude aircraft imagery covering the test area was acquired from Flight Number 75-180 on October 20, 1975. Both color (400 to 77 mm) and color IR (510 to 900 mm) photography were included. Photo products were received late in the report period.

## SUPPLEMENTARY PERIOD PROGRESS REPORT

NASA Investigation #22640

February 21, 1976 - May 21, 1976

### A. PROBLEMS

Essentially the only source of difficulty during the supplementary period was the fact that excess costs, occasioned by delays in obtaining imagery throughout the entire study period, had resulted in cost over-runs for ERIM. Despite that situation, ERIM completed necessary data processing, although scheduling problems resulted in further delays. Thus, Department for Natural Resources and Environmental Protection - Reclamation Division personnel and MATHEMATICA did not receive the process recognition maps and graymaps until the end of the supplementary period.

### B. ACCOMPLISHMENTS

During the supplementary period, MATHEMATICA continued to refine the cost effectiveness models for strip mine monitoring systems. Present models use a three-tier inspection system involving satellite, aircraft, and ground inspections. One decision rule used in the present model assumes that aircraft or ground inspection will be used only if the satellite inspection classifies an area as a problem area. It is anticipated that, because of resolution and cloud cover problems, the LANDSAT satellite system will not be able to detect certain types of violations. Therefore, a revised model is being considered in which aircraft or ground inspection is always used under, at least, a limited basis at every surface mine. The utility of the LANDSAT satellite system, if any, would then be the result of two components:

- possibly lower misclassification probabilities occur under LANDSAT than under aircraft or ground inspection for revegetation violations; and
- the number of visits to a mining area by either aircraft or ground inspection can be reduced by using LANDSAT.

SUPPLEMENTARY PERIOD PROGRESS REPORT  
Page Two

MATHEMATICA has also considered modeling misclassification probabilities as a function of the area covered by a pixel on the LANDSAT data. Such modeling is necessary to estimate the effectiveness of having a higher resolution for future satellite systems.

In this period, ERIM processed the computer compatible tapes of the LANDSAT-2 data of October 30, 1975. The quality of the data in MSS channels 6 and 7 was seen to be very good. However, MSS 4 has a detector problem, also encountered in the February data set, which produces a striping pattern every sixth line. This noisiness in the data was readily apparent in the ratio graymap of MSS 5/MSS 4. Some slight striping also showed up in MSS 5. Results were presented in the form of ozalid color separates, single channel and ratio graymaps, and a color-coded recognition map.

C. SIGNIFICANT RESULTS

None to report.

D. PUBLICATIONS

None

E. RECOMMENDATIONS

None

F. FUNDS EXPENDED TO MAY 21, 1976

\$2,731.00

G. DATA USE TO MAY 21, 1976

	<u>VALUE OF DATA ALLOWED</u>	<u>VALUE OF DATA ORDERED</u>	<u>VALUE OF DATA RECEIVED</u>
LANDSAT Imagery	700	427	427
Computer Compatible Tapes	1000	400	400
Aircraft Imagery	2538	1904	1904

H. AIRCRAFT DATA

No aircraft data were received during the report period.